OIPE IAP45 FEB 06 2006 PATENT & TRADEMARK OFFICE

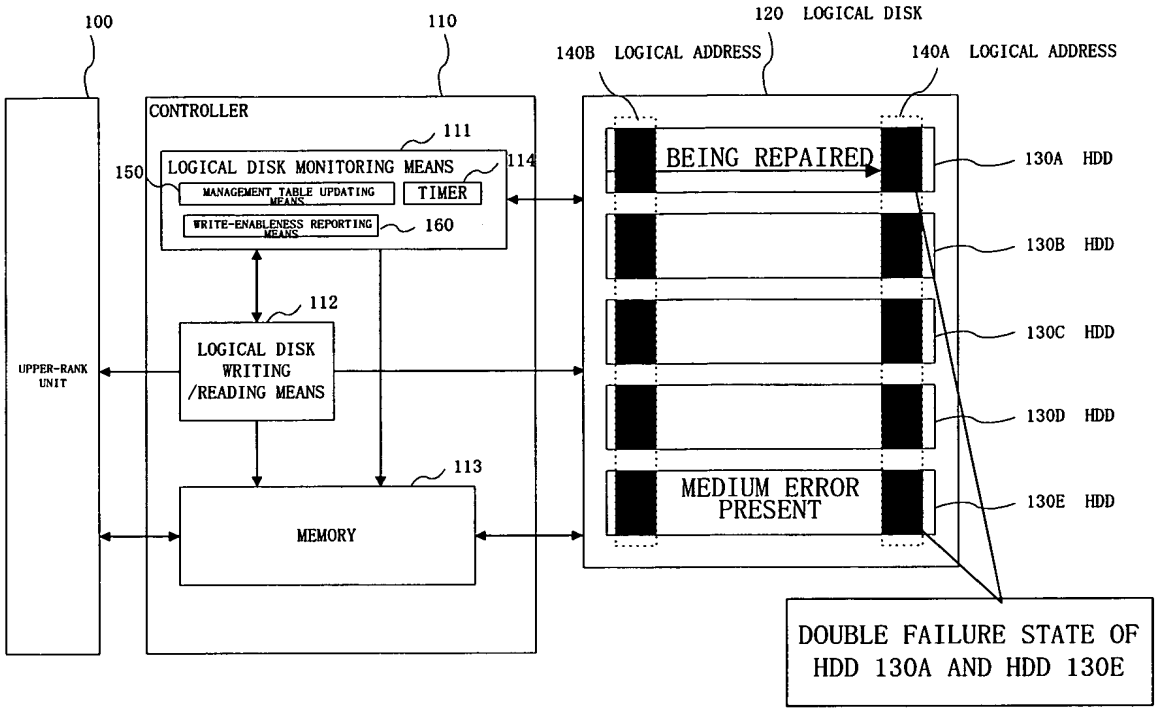

FIG. 1

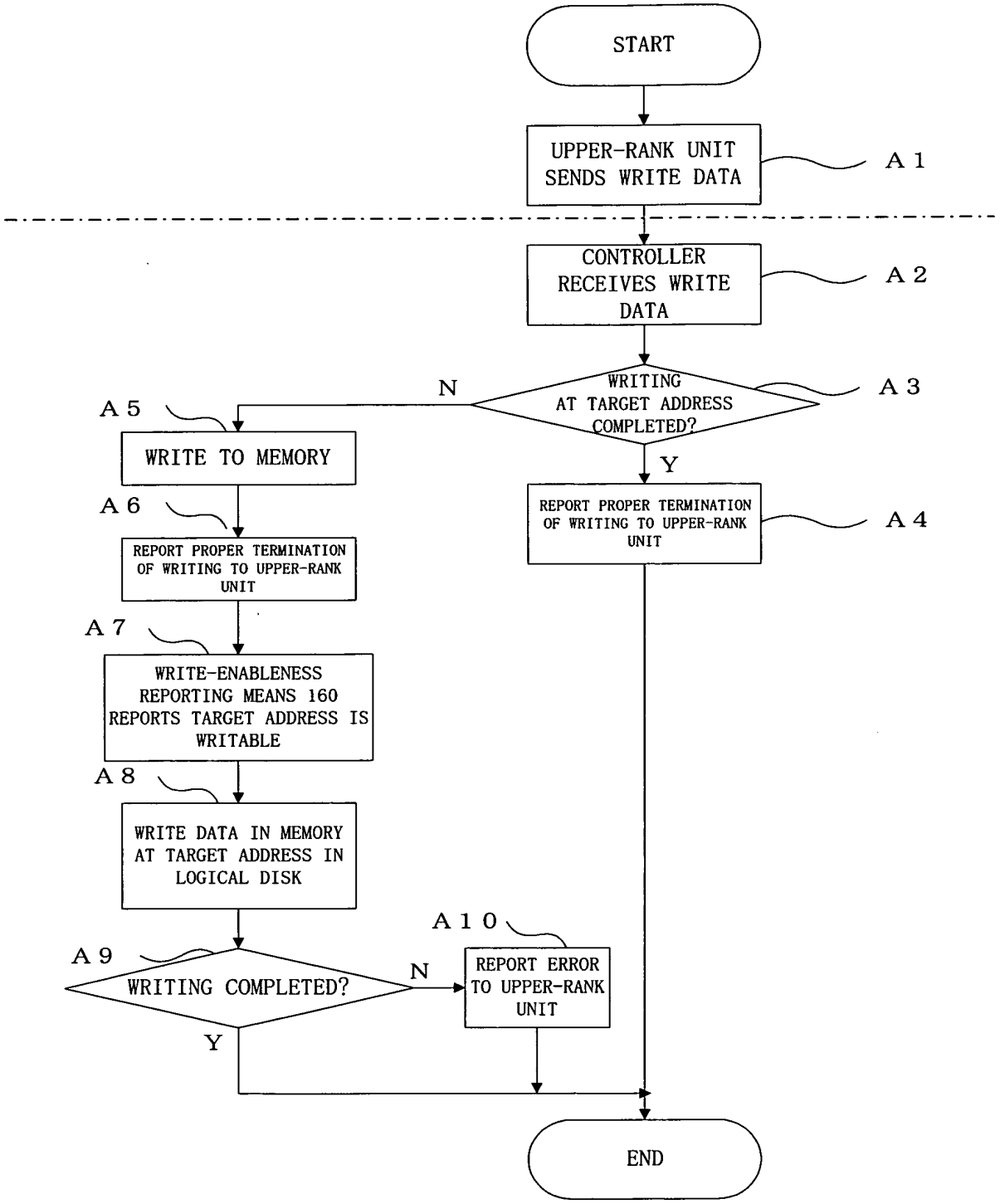
START
UPPER-RANK UNIT SENDS WRITE DATA
A 1
CONTROLLER RECEIVES WRITE DATA
A 2
WRITING AT TARGET ADDRESS COMPLETED?
A 3
N
Y
A 5
WRITE TO MEMORY
A 6
REPORT PROPER TERMINATION OF WRITING TO UPPER-RANK UNIT
A 7
WRITE-ENABLENESS REPORTING MEANS 160 REPORTS TARGET ADDRESS IS WRITABLE
A 8
WRITE DATA IN MEMORY AT TARGET ADDRESS IN LOGICAL DISK
A 9
WRITING COMPLETED?
N
Y
A 10
REPORT ERROR TO UPPER-RANK UNIT
REPORT PROPER TERMINATION OF WRITING TO UPPER-RANK UNIT
A 4
END

FIG. 2

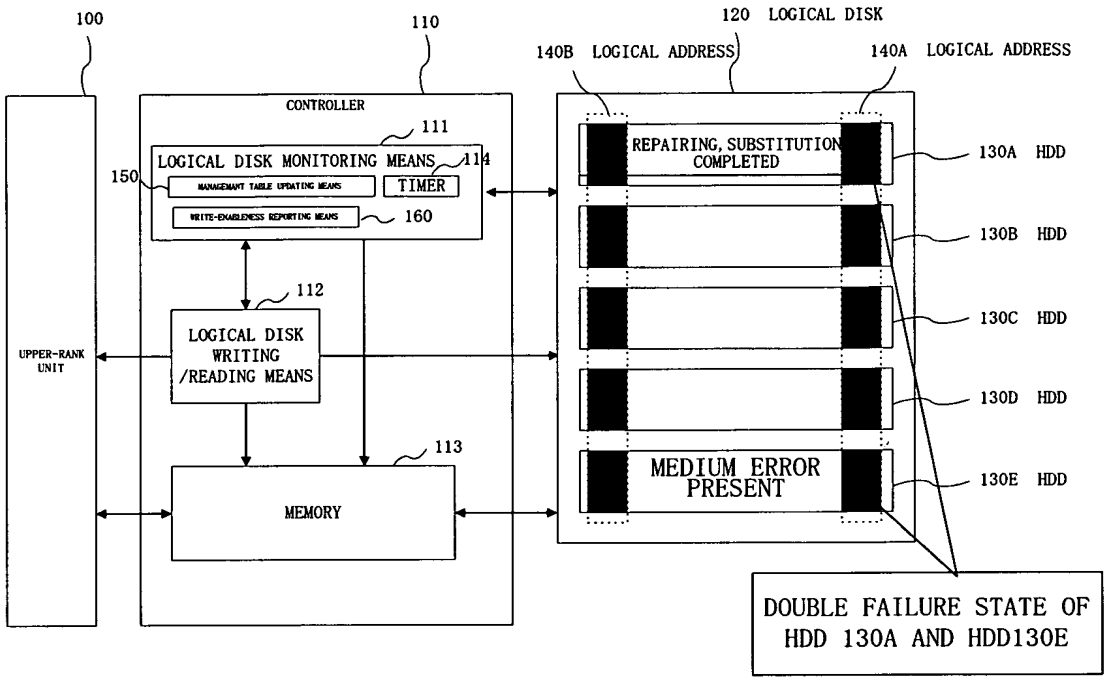
100
110
120 LOGICAL DISK
140B LOGICAL ADDRESS
140A LOGICAL ADDRESS
CONTROLLER
111
LOGICAL DISK MONITORING MEANS
114
TIMER
150
MANAGEMANT TABLE UPDATING MEANS
WRITE-ENABLENESS REPORTING MEANS
160
112
LOGICAL DISK WRITING /READING MEANS
UPPER-RANK UNIT
113
MEMORY
REPAIRING, SUBSTITUTION COMPLETED
MEDIUM ERROR PRESENT
130A HDD
130B HDD
130C HDD
130D HDD
130E HDD
DOUBLE FAILURE STATE OF HDD 130A AND HDD130E

FIG. 3

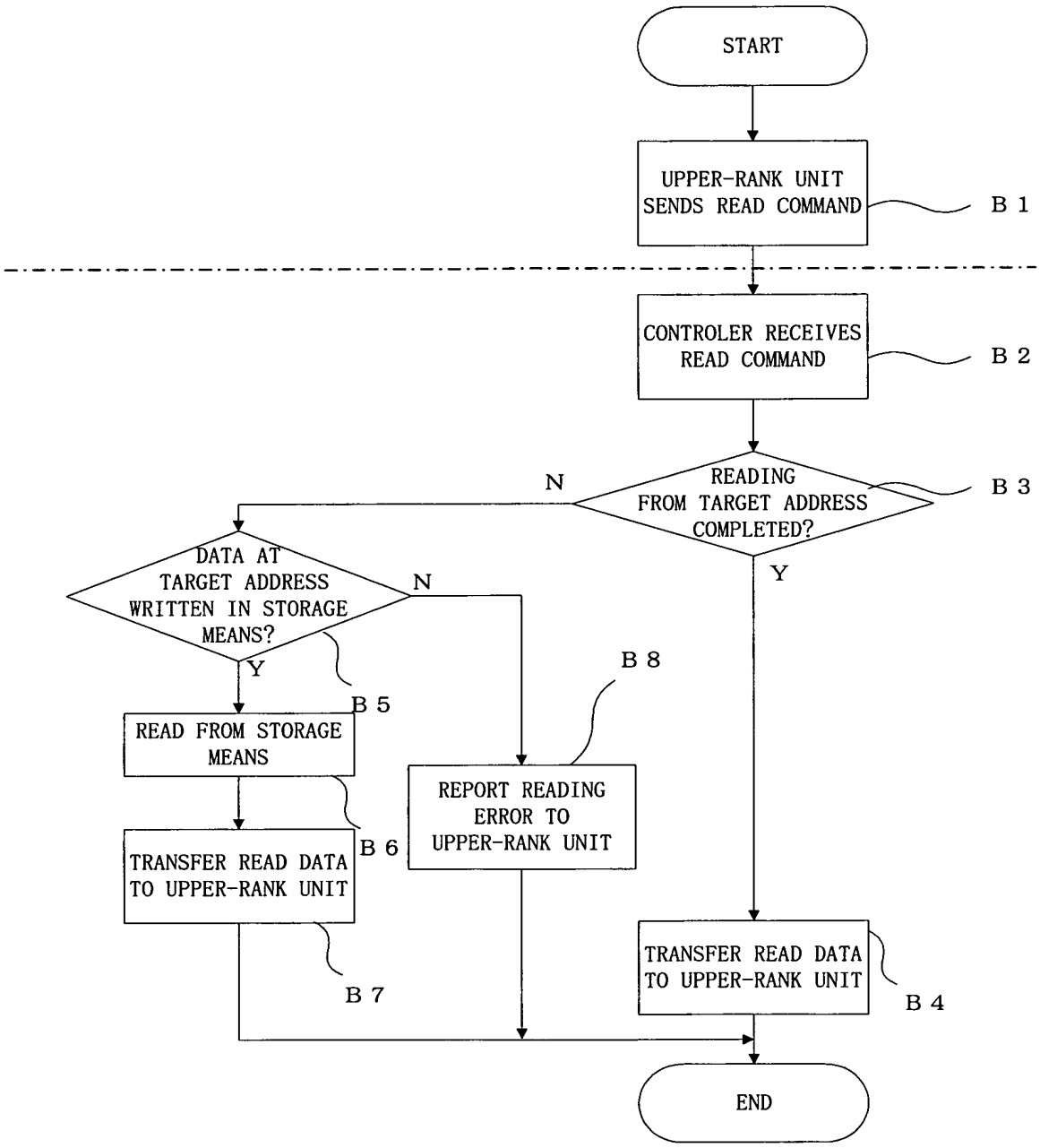
START
UPPER-RANK UNIT SENDS READ COMMAND
B 1
CONTROLER RECEIVES READ COMMAND
B 2
READING FROM TARGET ADDRESS COMPLETED?
B 3
N
Y
DATA AT TARGET ADDRESS WRITTEN IN STORAGE MEANS?
N
Y
B 5
B 8
READ FROM STORAGE MEANS
REPORT READING ERROR TO UPPER-RANK UNIT
TRANSFER READ DATA TO UPPER-RANK UNIT
B 6
B 7
TRANSFER READ DATA TO UPPER-RANK UNIT
B 4
END

FIG. 4

MANAGEMENT TABLE 151

LOGICAL ADDRESS		...	140B	...	140A	...
1. Repair						
2. REASSIGN DONE/UNDONE						
3.	Read					
	Write					

FIG. 5

LOGICAL ADDRESS	1 4 0 A	
1. Repair	Repairskip	
2. REASSIGN DONE/UNDONE	Reasign OK	
3. Read / Write	READ NG	WRITE OK

FIG. 6

LOGICAL ADDRESS	1 4 0 B	
1. Repair	Repair OK	
2. REASSIGN DONE/UNDONE		
3. Read / Write	READ OK	WRITE OK

FIG. 7

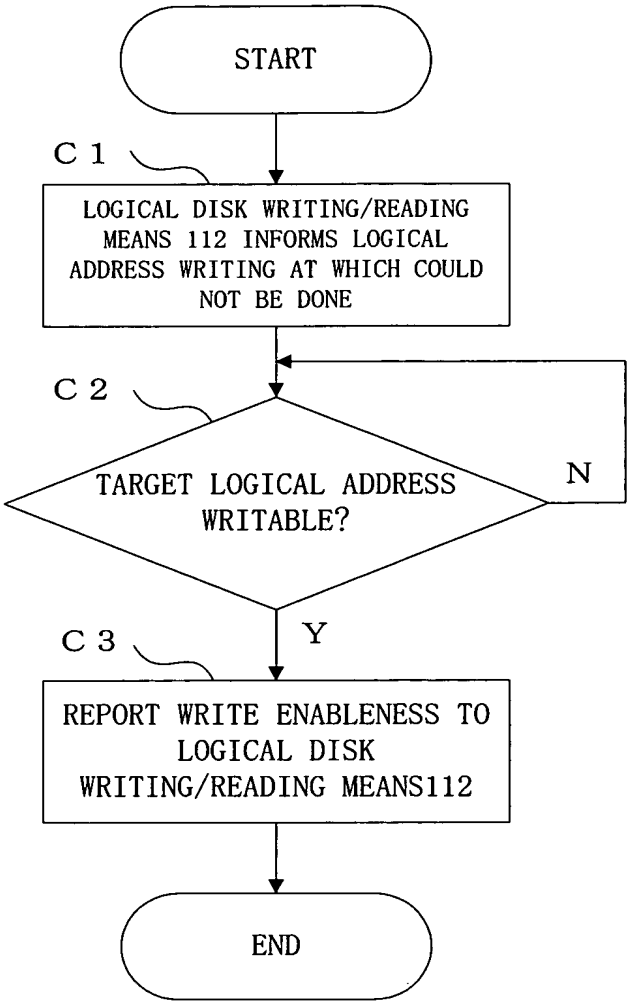
START
C 1
LOGICAL DISK WRITING/READING MEANS 112 INFORMS LOGICAL ADDRESS WRITING AT WHICH COULD NOT BE DONE
C 2
TARGET LOGICAL ADDRESS WRITABLE?
N
Y
C 3
REPORT WRITE ENABLENESS TO LOGICAL DISK WRITING/READING MEANS112
END

FIG. 8

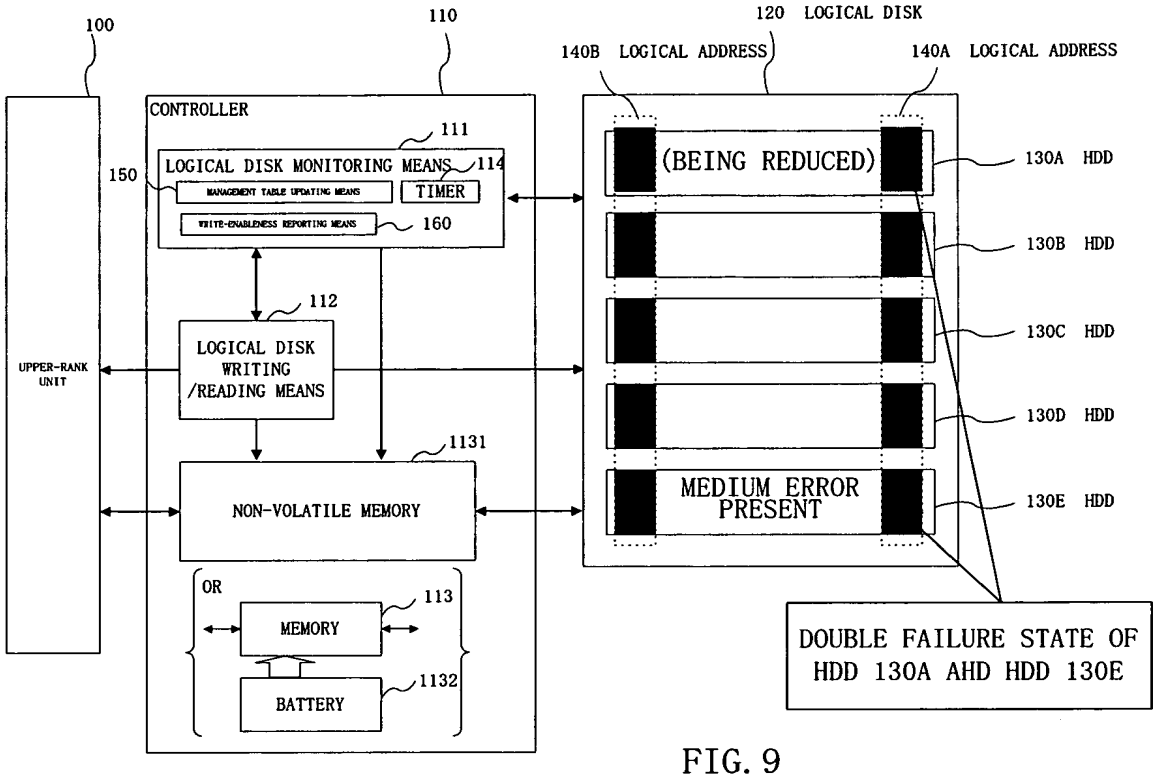
100
110
120 LOGICAL DISK
140B LOGICAL ADDRESS
140A LOGICAL ADDRESS
CONTROLLER
111
LOGICAL DISK MONITORING MEANS
114
150
MANAGEMENT TABLE UPDATING MEANS
TIMER
WRITE-ENABLENESS REPORTING MEANS
160
112
LOGICAL DISK WRITING /READING MEANS
UPPER-RANK UNIT
1131
NON-VOLATILE MEMORY
OR
113
MEMORY
1132
BATTERY
(BEING REDUCED)
MEDIUM ERROR PRESENT
130A HDD
130B HDD
130C HDD
130D HDD
130E HDD
DOUBLE FAILURE STATE OF HDD 130A AHD HDD 130E

FIG. 9

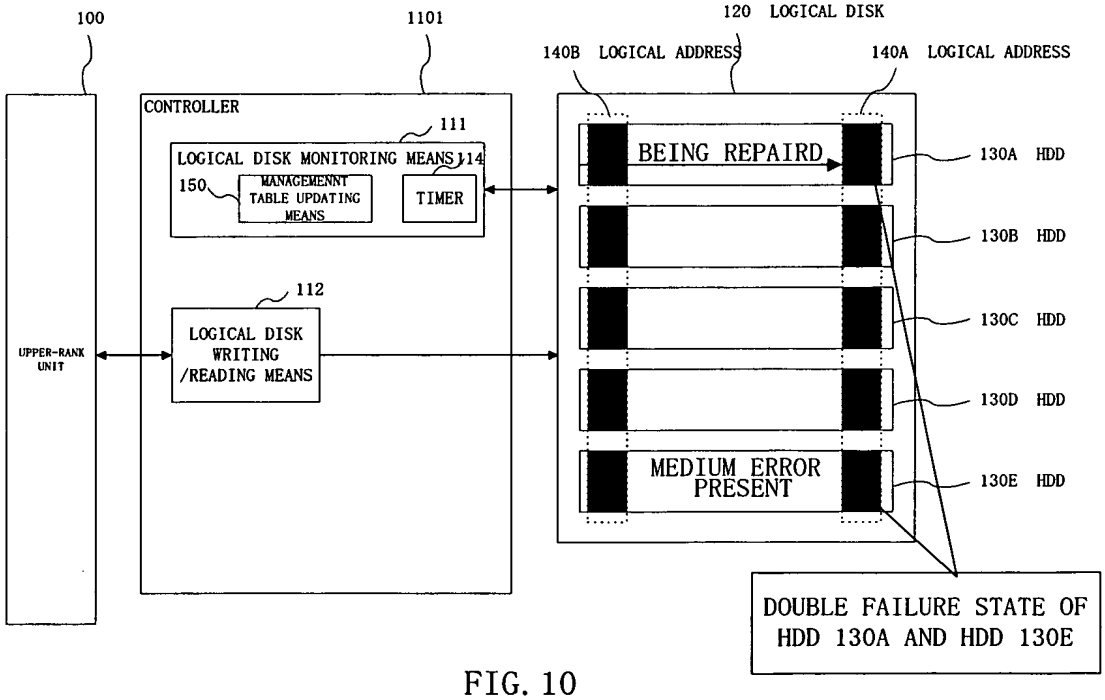
100
1101
120 LOGICAL DISK
140B LOGICAL ADDRESS
140A LOGICAL ADDRESS
CONTROLLER
111
LOGICAL DISK MONITORING MEANS
114
150
MANAGEMENNT TABLE UPDATING MEANS
TIMER
112
LOGICAL DISK WRITING /READING MEANS
UPPER-RANK UNIT
BEING REPAIRD
MEDIUM ERROR PRESENT
130A HDD
130B HDD
130C HDD
130D HDD
130E HDD
DOUBLE FAILURE STATE OF HDD 130A AND HDD 130E

FIG. 10

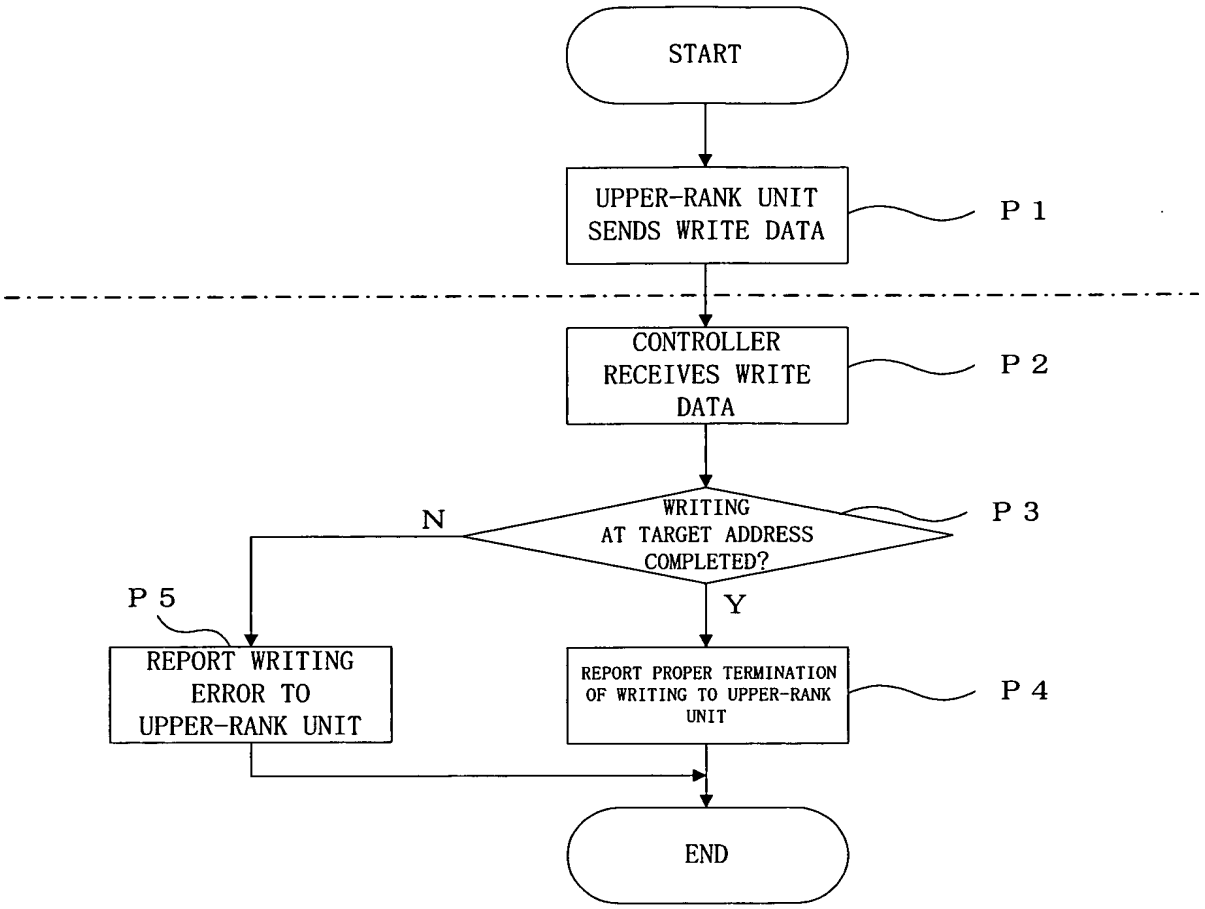
START
UPPER-RANK UNIT SENDS WRITE DATA
P 1
CONTROLLER RECEIVES WRITE DATA
P 2
WRITING AT TARGET ADDRESS COMPLETED?
P 3
N
Y
P 5
REPORT WRITING ERROR TO UPPER-RANK UNIT
REPORT PROPER TERMINATION OF WRITING TO UPPER-RANK UNIT
P 4
END

FIG. 11

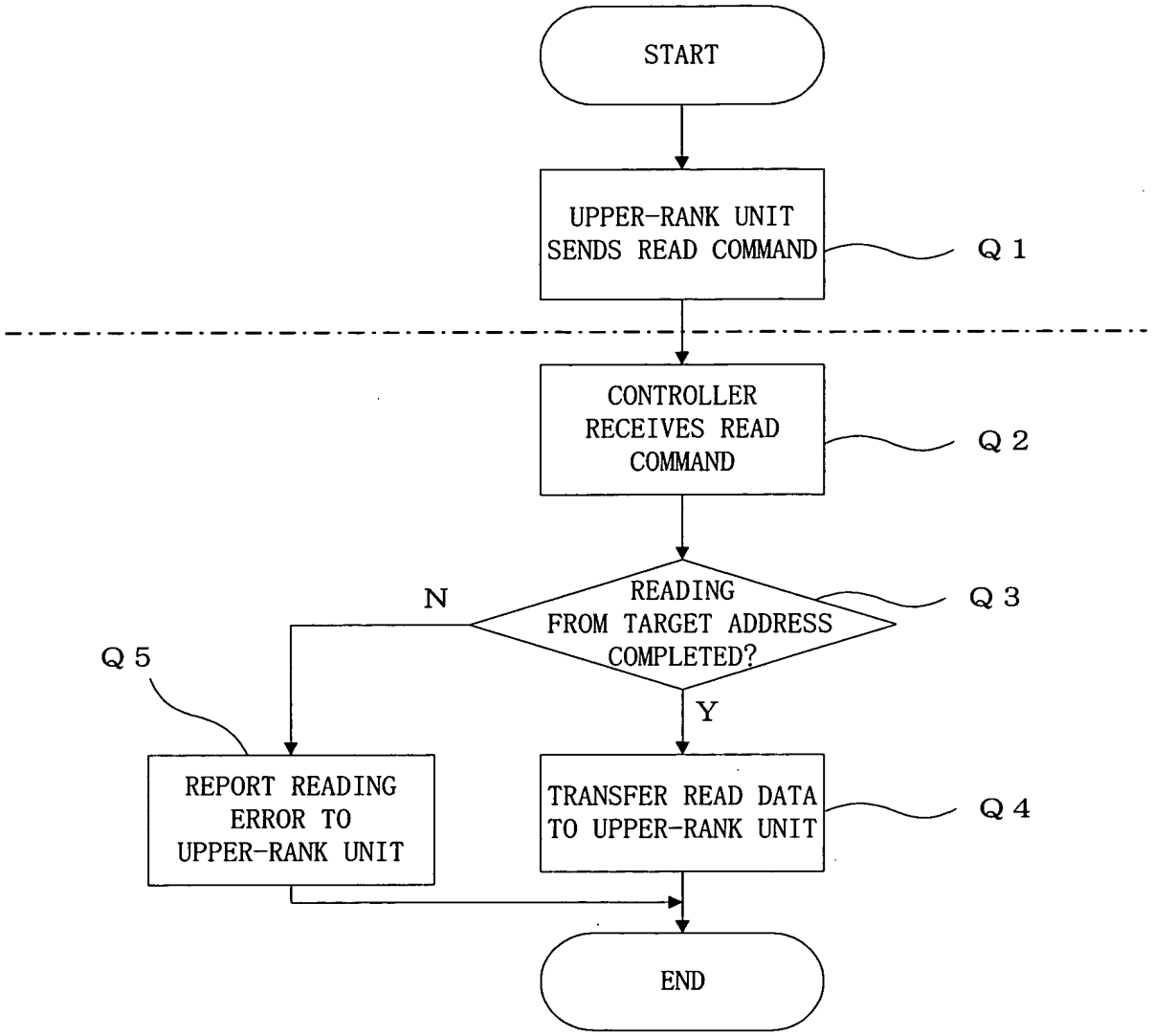
START
UPPER-RANK UNIT SENDS READ COMMAND
Q 1
CONTROLLER RECEIVES READ COMMAND
Q 2
READING FROM TARGET ADDRESS COMPLETED?
Q 3
N
Y
Q 5
REPORT READING ERROR TO UPPER-RANK UNIT
TRANSFER READ DATA TO UPPER-RANK UNIT
Q 4
END

FIG. 12

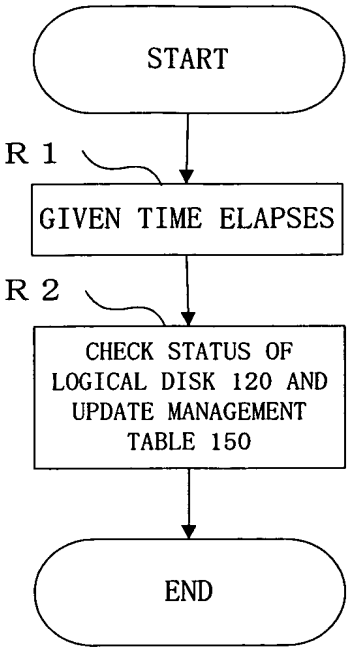
START
R 1
GIVEN TIME ELAPSES
R 2
CHECK STATUS OF LOGICAL DISK 120 AND UPDATE MANAGEMENT TABLE 150
END

FIG. 13